



Unit 2



Tools for Plumbing

INTRODUCTION

So far, we have studied the importance of the plumbing system, and the basic terms related to it. We will now look at the various tools that help a plumber perform the plumbing activities effectively. Like any other sector, a thorough knowledge and working of tools and equipment used in plumbing are essential for a plumber to carry out the tasks.

A plumber requires several tools for the fitting work for plumbing, fixing a tap or to carry out repairs. These tools help the plumber in performing one's work properly, and therefore it is important that the tools are used systematically and handled carefully to avoid any damage. They should be kept at a designated place after use. The tools can be categorised as per the nature of work like holding tools, fitting tools, cutting tools, pipe threading and bending tools, etc.

The major tools used in plumbing are categorised as follows.

1. Holding tools

- (a) Bench vice
- (b) Pipe vice

2. Fitting tools

- (a) Wrenches
- (b) Water-pump pliers
- (c) Spanners

NOTES

3. Cutting tools

- (a) Pipe cutter
- (b) Hacksaw

4. Pipe bending tools

- (a) Pipe bending machine
- (b) Threading dies

5. Other tools

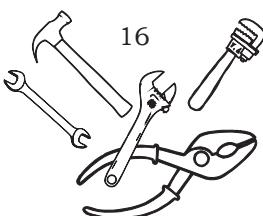
- (a) Chisel
- (b) Hammer
- (c) Chain wrench
- (d) Rover jumper
- (e) Trowel
- (f) Screwdriver
- (g) File
- (h) Plier
- (i) Caulking tools
- (j) Drill machine
- (k) Drill bit
- (l) Hanger
- (m) Measuring tape
- (n) Plumb rule and bob
- (o) Spirit level
- (p) Spade
- (q) Shovel
- (r) Pickaxe
- (s) Mortar pan
- (t) Mason's square
- (u) Water level tube

HOLDING TOOLS

Tools which are used for holding the pipes, pipe fittings and fixtures for plumbing operations are called holding tools. Some of the commonly used holding tools are mentioned below.

Bench vice

A vice is a tool used for holding an object for various tasks like filing, chipping, sawing, threading, tapping, bending, etc. The bench vice has two jaws, one of which is fixed and the other is movable. These jaws are fitted with plates for a better grip on the object during the



task. The vice size depends on the width of the jaw. A bench vice is fixed to a table or a bench through a bolt. A vice is opened and closed with the help of a handle attached to a spindle. In this way, the object is held tightly. Bench vices hold the objects and allow the use of other tools to complete the tasks (Fig. 2.1).

Pipe vice

It is a tool used for holding a pipe for carrying out assembly, disassembly, threading, cutting, etc. (Fig. 2.2). Pipe vices are of two types.

1. Open side pipe vice
2. Fixed side pipe vice

Standard sizes of vices are 80 mm, 105 mm, 130 mm, 170 mm, etc., as per the opened size of the jaws.

FITTING TOOLS

While holding tools are used to keep the objects in place, fitting tools are used for carrying out various plumbing operations like cutting, tightening, fixing and other small tasks.

Wrenches

These are hand tools used for tightening and loosening the nuts and bolts (Fig. 2.3). Wrenches hold slippery or small nuts and bolts for loosening or tightening them. Mostly, two types of wrenches are used—adjustable and non-adjustable. These are useful particularly in case of odd-sized nuts and bolts. These tools hold a pipe and pipe fittings for screwing or unscrewing. This is a very common tool, especially for small diameter pipes upto 50 mm.

Adjustable wrench

This type of wrench is used to loosen or tighten the nuts and bolts of any odd and regular sizes. It is used for tightening and loosening valves, cocks, geysers, flexible pipes, etc. It is a good maintenance tool for repair of plumbing items like valves, cocks, pumps, etc.



Fig. 2.1: Bench vice



Fig. 2.2: Pipe vice



Fig. 2.3: Pipe wrenches

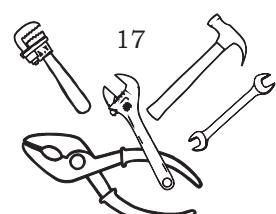




Fig. 2.4: Different types of wrench (adjustable)



Fig. 2.5: Adjustable wrench



Fig. 2.6: Water-pump pliers

It has a fixed flat jaw with a handle and a square-toothed screw (Fig. 2.5). The movable flat jaw slides in the body of the fixed jaw with the support of a screw. The gap between the flat jaws is used to hold the object to be twisted for screwing or unscrewing.

Water-pump plier

It is a common plier used by plumbers for holding, tightening and loosening work during the fixing process.

Steel is used for manufacturing water-pump pliers. These are available in only one standard size of 250 mm length. The maximum width possible between the two jaws is 40 mm (Fig. 2.6).

Spanners

This tool is used for tightening and loosening nuts and bolts of standard size. The standard spanners used are discussed below.

Ring spanners

These spanners have full circular closed ring at both ends. It is difficult to slip and cause damage. It is made through forging process, with a burnished finish or chrome-plating (Fig. 2.7a).

Open-ended spanners

These types of spanners are open from both sides and are used for tightening and loosening nuts and bolts (Fig. 2.7b).

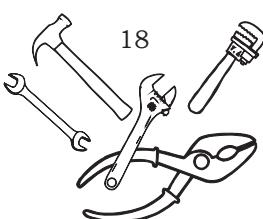
A spanner having open-ended jaws slides through the nut or bolt with square or hexagonal heads. The bolts or nuts are then turned with the required force to screw or to unscrew. The two jaws have two consecutive sizes like 6 mm and 7 mm or $1/4"$ and $5/16"$, etc.



Fig. 2.7 (a) Ring spanner



Fig. 2.7 (b) Open-ended spanner



Combination spanners

These spanners are open at one end and closed at the other (Fig. 2.7c).

Bi-hexagonal ring spanner

It has a bi-hexagonal shape at both the ends to hold a nut or bolt, the head of which is square or hexagonal. The sizes of the two ends are consecutive like 6 mm and 7 mm, $1/4"$ and $5/16"$, etc. (Fig. 2.8).



Fig. 2.7 (c) Combination spanner



Fig. 2.8: Bi-hexagonal spanner



Fig. 2.9: Pipe cutter



Fig. 2.10: Hand-operated hacksaw



Fig. 2.11: Power hacksaw

PIPE BENDING TOOLS

In most of the plumbing operations, pipes are required to be bent at different angles as per requirement, for which pipe bending tools are used. Some of these tools are mentioned below.

Pipe bending machine

This equipment is used to bend or turn pipes. The size and strength of the machine depends upon the diameter

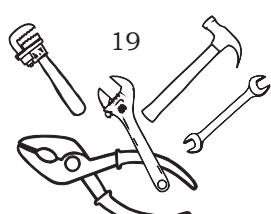




Fig. 2.12: Pipe bending machine



Fig. 2.13: Threading die



Fig. 2.14: Chisel



Fig. 2.15: Hammers

of the pipe and the type of the pipe material to be bent. The mechanical or hand-operated pipe bending machines are available for 3/8– 1" diameter pipes. For higher ranges, i.e., 1/2–2", 1/2 – 3", 1/2– 4" and 2– 6", hydraulic hand-operated machines are used (Fig. 2.12).

Threading dies

Threading is crucial for joining pipes and fixtures effectively. A threading die is used for making threads in a pipe where it is to be joined with another pipe or fixture (Fig. 2.13).

OTHER TOOLS

Apart from the already mentioned holding, fitting, cutting and bending tools, various other tools are also used in plumbing operations. These are listed below.

Chisel

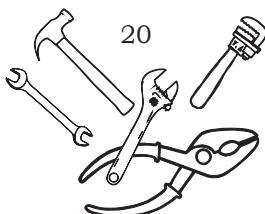
It is made of hard metal and is mostly used for cutting concrete surface and making grooves in the walls with the help of a hammer (Fig. 2.14).

Hammer

These are general purpose workshop hand tools used for straightening of sections, riveting, striking of nails and inserting the component by striking, inserting keyways and fitting by striking. The hammer consists of a head made of hard and tampered steel, and a wooden handle. The head has a flat striking face and the other side is called pein. The peins are classified as per different shapes such as ball pein, cross pein and straight pein. The hammers made of hardened steel are known as engineer's hammers and are usually used while working with steel components. A one-kilogram hammer is the most commonly used hammer (Fig. 2.15).

Chain wrench

The common holding tools do not help much in case of large diameter pipes. For these, chain wrenches are used. A chain wrench consists of a toothed block, a



handle and a chain. The chain is round, grooved and held on the toothed end of the block. The chain grips the pipe fitting and screws or unscrews. The chain wrench is available in 3", 4", 6", 8" and 12", with the length 475 mm, 585 mm, 834 mm, 1100 mm and 1360 mm respectively. These sizes are designated by the maximum diameter of the pipe it can hold (Fig. 2.16).



Fig. 2.16: Chain wrench

Screwdriver

This tool is often used by plumbers to fit the screws. Screwdrivers have a sharp tip which can easily fit into various screws. Different types of screwdriver are used for various types of screw. Various types of heads of the screwdriver are used by plumbers (Fig. 2.17).

Files

These hand tools are used for a variety of work, like removing of sharp edges, metal removal, shaping of jobs, smoothening of surfaces, finishing, producing different shapes, etc. The file has five parts—tang, heel, face, edge and point or tip. Various types of files of different shapes like hand round, pillar, square, three square, half round, flat, knife edge and needle file are used as per the work (Fig. 2.18).



Fig. 2.17: Screwdriver



Fig. 2.18: File

Pliers

They are important tools used for holding small objects and for tightening or loosening various parts. Several types of pliers are used during plumbing work. Pliers can be used for cutting purpose also. Various shapes and sizes of pliers are available in the market.



Fig. 2.19: Plier

Caulking tools

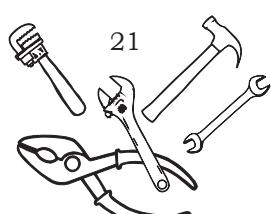
Caulk or caulking is a material used to seal joints or seams against leakage in various structures and piping. Caulking tools help in filling and removing material in the building (Fig. 2.20).



Fig. 2.20: Caulking tools

Drill machine

One of the common but important tools used for making a hole in a metal or wood, or concrete surface is a drill machine (Fig. 2.21). It is fitted with a cutting tool like



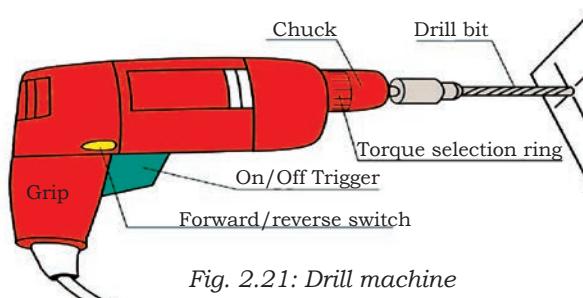


Fig. 2.21: Drill machine



Fig. 2.22: Drill bits



Fig. 2.23: Pipe hangers

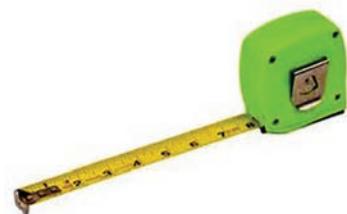


Fig. 2.24: Measuring tape



Fig. 2.25: Plumb bob



Fig. 2.26: Spirit level

a drill bit. The attachment is tightened with a key.

Safety precautions

Before installing the bit in a drill machine, it should be sharpened. The key in the chuck, a part of the drill machine used for tightening the drill bit, should be removed after tightening.

Drill bits

These are the tools used to make cylindrical holes by cutting the material. It is fitted in a tool which rotates it and make the hole. For non-cylindrical shaped holes, specialised bits are used (Fig. 2.22).

Hangers

The purpose of a pipe hanger is to hold or support a pipe or a group of pipes from a slab, beam, ceiling or other structural elements (Fig. 2.23).

Measuring tape

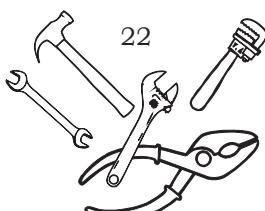
It is used for measuring the length, breadth and height of an item. The measuring tape is manufactured in various material like steel, cloth and PVC. The length range available is one metre, two metres, three metres, five metres, 10 metres, 15 metres, etc. (Fig. 2.24).

Plumb rule and bob

This is a useful tool to ensure verticality and uniformity during construction of walls, columns and wooden frames like doors and windows. It also helps in levelling the surface of the floor. It consists of a holding pipe, thread and a plumb bob made of wood and metal. The plumb bob is connected to the holding pipe with the thread (Fig. 2.25).

Spirit level

It is used to check the horizontality or levelling of the floor, roof, door, window frame, etc. (Fig. 2.26).



Trowel

It is used for mixing cement and sand for masonry work. It is used for plastering the surface (Fig. 2.27).



Fig. 2.27: Trowel

Spade

It is used for digging purpose and for mixing cement, sand and concrete. It consists of a flat form made of steel with an eye hole to hold the wooden handle. The size of a spade is designated by its width and length of the plank (Fig. 2.28).



Fig. 2.28: Spade

Shovel

It is used for mixing concrete and also for carrying concrete to mortar pans. Shovels are made of steel sheets. The size is designated by its length and width (Fig. 2.29).



Fig. 2.29: Shovel

Pickaxe

It is made of steel and is used to excavate hard soil. One end of the pickaxe is flat whereas, the other end is sharp in design (Fig. 2.30).



Fig. 2.30: Pickaxe

Mortar pan

This is used to carry the excavated material, cement mortar, concrete, etc. It should never be used for measurement of mixed cement mortar, etc. Mild steel sheet is used for making mortar pan (Fig. 2.31).



Fig. 2.31: Mortar pan

Mason's square

It is used to check rectangularity of external and internal corners. It is made of carbon steel sheet. The dimension is also marked on both the sides, either in inch or centimetre (Fig. 2.32).



Fig. 2.32: Mason's square

Water level tube

This tube is used to check and transfer water levels, etc. Water is poured inside the tube at the time of use. Polythene tubes of varying diameter from 10 to 15 mm, and lengths varying as per the requirement are used (Fig. 2.33).



Fig. 2.33: Water level tube

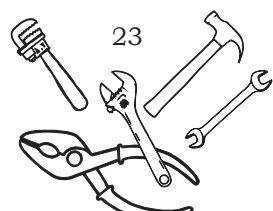




Fig. 2.34: Rover jumper

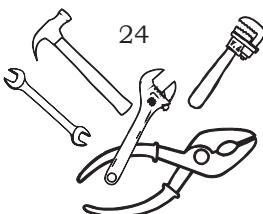
Rover jumper

It is used for making a gap in the wall so that plumbing fixtures can be fixed (Fig. 2.34).

SAFETY DURING WORK

The following precautionary measures may be taken for the safe use of plumbing tools.

1. Use the correct methods given in the 'Instruction Manual of tools' while using them.
2. Use the appropriate tools required for the specific work or job. For example, do not use pliers instead of a hammer; use only a hacksaw to cut.
3. Keep the tools in working condition and ensure the required maintenance.
4. Ensure that the necessary protective equipment are available.
5. Follow safety methods while using electrical wires. For instance, make sure your hands are absolutely dry while coming in contact with electrical wires.
6. Use kerosene oil for removing dust from rusty nuts.
7. Do not use tools without a handle as they may not give proper grip.
8. Remove burrs or stuck material from the head of the chisel and the edges of tools.
9. Wear safety glasses while using power tools like a drill machine.
10. Keep metal parts lightly lubricated.
11. Do not apply excessive pressure or force.
12. Inspect the tools regularly.
13. Use or wear safety gear (helmet, gloves, goggles, safety shoes, ear plugs, etc.).



Practical Exercises

NOTES

Activity 1

Draw figures of plumbing tools.

Material required

1. Pen
2. Pencil
3. Plumbing tools

Procedure

1. Collect the plumbing tools available in your classroom.
2. Draw figures of the plumbing tools and label them.

Activity 2

Draw figures of masonry tools.

Material required

1. Pen
2. Pencil
3. Masonry tools

Procedure

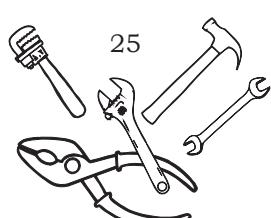
1. Collect the masonry tools available in your classroom.
2. Draw figures of the masonry tools and label them.

Check Your Progress

A. Answer the following questions

1. Classify the different plumbing tools according to their use.
2. Give the uses of the following
 - (a) Holding tools
 - (b) Fitting tools
 - (c) Cutting tools and
 - (d) Pipe bending tools
3. Discuss the role of chain wrench in plumbing work.
4. Why is a wrench used in the plumbing work? What is the purpose of using an adjustable wrench?
5. Discuss the role of the plumb rule and bob. Also mention its different parts.

TOOLS FOR PLUMBING



NOTES

B. Fill in the blanks

1. The _____ is a work holding device.
2. The purpose of a pipe hanger is to _____ or _____ a pipe or a group of pipes.
3. _____ is used to check rectangularity of external and internal corners.
4. _____ is a tool used for making a hole in a metal or wood.

C. Multiple choice questions

1. Which of the following instruments indicate whether a surface is horizontal or vertical?
 - (a) Square
 - (b) Spirit level
 - (c) Plumb
 - (d) Crowbar
2. The device which is used to hold a pipe for carrying out assembly, disassembly, threading and cutting is
 - (a) wrench
 - (b) pipe vice
 - (c) bench pipe
 - (d) hack saw
3. A threading die is used to
 - (a) cut pipe
 - (b) cut grooves of threads
 - (c) unscrew water pipes
 - (d) seal joints
4. Measuring tape is used to measure
 - (a) length
 - (b) breadth
 - (c) height
 - (d) All of the above

D. Match the following

| | | |
|---|-----|---|
| 1. Tool used for mixing concrete | (a) |  |
| 2. Tool used in plumbing for cutting and jointing works | (b) |  |
| 3. Tool to cut a pipe at site | (c) |  |
| 4. Vice used to hold the assembly | (d) |  |

